



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/630,642	07/29/2003	Jing-Horng Gau	JCLA8556-D	8272
23900	7590	01/30/2006	EXAMINER	
J C PATENTS, INC. 4 VENTURE, SUITE 250 IRVINE, CA 92618			GHYKA, ALEXANDER G	
			ART UNIT	PAPER NUMBER
			2812	

DATE MAILED: 01/30/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

## Office Action Summary

Application No.

10/630,642

Applicant(s)

GAU ET AL.

Examiner

Alexander G. Ghyka

Art Unit

2812

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 12/14/2005 (RCE).
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 14-27 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 22-27 is/are allowed.
- 6) ☒ Claim(s) 14, 15, 20 and 21 is/are rejected.
- 7) ☒ Claim(s) 16-19 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

ALEXANDER GHYKA  
PRIMARY EXAMINER

*Av 2812*  
*Alx Ghyka*

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)  
Paper No(s)/Mail Date \_\_\_\_\_.
- 4) ☐ Interview Summary (PTO-413)  
Paper No(s)/Mail Date. \_\_\_\_\_.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: \_\_\_\_\_.

### **DETAILED ACTION**

The RCE submitted on 12/14/05 has been entered.

Claims 14-27 are pending. Claims 22-27 are allowed and claims 16-19 are objected to as being dependent on a rejected claim, but are allowable over the cited art. Applicants' arguments with respect to claims 14-15 and 20-21 have been considered, but are not persuasive for the reasons as discussed below.

### ***Claim Rejections - 35 USC § 103***

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

**Claims 14-15 and 20-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Applicants' Admitted Prior Art (Page 2 of the Present Specification and Figure 6) in view of Lebowitz (US 4,694,561).**

The present Claims generally require a method of forming a variable capacitor, comprising the steps of providing a substrate having a first type ion-doped buried layer and a first type ion doped well, wherein the first type ion-doped buried layer is below and in connection to the first type ion-doped well; forming a conductive layer in the substrate below the first type ion-doped buried layer; removing a portion of the first type ion-doped well to form at least one first opening without exposing the first type ion-doped buried layer; and forming a second type ion-doped region in the first type ion-doped well at the bottom of the first opening.

Applicants' Admitted Prior Art as discussed on page 2 and Figure 6 of the present Specification, disclose a variable substrate (10), a first type ion-doped well (14) in the substrate and a buried layer (12) in the substrate underneath the first type ion-doped well. The first type ion-doped buried layer and the first type ion-doped well are connected. There is a second type ion-doped region (20) in the first type ion-doped well. A conductive layer (28 or 30) is formed over the first type ion-doped buried layer, wherein the conductive layer and the first type ion-doped layer are connected indirectly through contact with the second ion-doped and the first type ion-doped well as required by present Claim 15. With respect to Claim 20, the Applicants' Admitted Prior Art discloses a metal silicide (24) over the second type ion-doped region and conductive

Art Unit: 2812

layer. With respect to Claim 21, the Applicants' Admitted Prior Art shows that the structure further includes an isolation structure (16) within the first type ion-doped well between the second type ion-doped region (18) and the conductive layer (30). See page 2 and Figure 6 of the present Specification.

The admitted prior art does not disclose removing a portion of the first type ion doped well to form at least one first opening as required by the present Claims.

Lebowitz discloses (col. 1, lines 30-65) that capacitors have been formed into trenches/openings to achieve specific values of capacitance and increase the density of capacitors in an array.

It would have been obvious to one of ordinary skill in the art, at the time of the invention, to modify the variable capacitor as disclosed by Applicants' Admitted Prior Art, by forming the capacitor in the bottom of an opening as taught by Lebowitz, for its known benefit of achieving high capacitance values and increasing the density of capacitors in an array. Therefore, a prima facie case of obviousness is established.

### ***Response to Applicants' Arguments***

In response to applicant's argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re*

Art Unit: 2812

*Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). In this case, it would have been obvious to one of ordinary skill in the art, at the time of the invention, to modify the variable capacitor as disclosed by Applicants' Admitted Prior Art, by forming the capacitor in the bottom of an opening as taught by Lebowitz, for its known benefit of achieving high capacitance values and increasing the density of capacitors in an array, and to thereby arrive at the presently claimed invention. Therefore, proper motivation is established.

Applicants argue that the Lebowitz reference and Applicants' Admitted prior art pertain to different problems to be solved. In response to applicant's argument that the Lebowitz reference and Applicants' Admitted prior art pertain to different problems, the fact that applicant has recognized another advantage which would flow naturally from following the suggestion of the prior art cannot be the basis for patentability when the differences would otherwise be obvious. See *Ex parte Obiaya*, 227 USPQ 58, 60 (Bd. Pat. App. & Inter. 1985).

The references cited by Applicants have been considered but are not relevant to the issue of whether a *prima facie* case has been established by the cited references. The Examiner further notes that the recitation "variable capacitor" has not been given patentable weight because the recitation occurs in the preamble. A preamble is generally not accorded any patentable weight where it merely recites the purpose of a process or the intended use of a structure, and where the body of the claim does not depend on the preamble for completeness but, instead, the process steps or structural limitations are able to stand alone. See *In re Hirao*, 535 F.2d 67, 190 USPQ 15 (CCPA

Art Unit: 2812

1976) and *Kropa v. Robie*, 187 F.2d 150, 152, 88 USPQ 478, 481 (CCPA 1951).

Applicants argue that the Leibowitz reference teaches a trench capacitor and no part of the capacitor of the invention is formed inside the opening or trench. In response to applicant's argument that the references fail to show certain features of applicant's invention, it is noted that the features upon which applicant relies (i.e., no presence of trench/opening) are not recited in the rejected claim(s). Although the claims are interpreted in light of the specification, limitations from the specification are not read into the claims. See *In re Van Geuns*, 988 F.2d 1181, 26 USPQ2d 1057 (Fed. Cir. 1993). The Examiner maintains that it would have been obvious to one of ordinary skill in the art, at the time of the invention, to modify the variable capacitor as disclosed by Applicants' Admitted Prior Art, by forming the capacitor in the bottom of an opening as taught by Leibowitz, for its benefit of achieving high capacitance values and increasing the density of capacitors in an array, and to thereby arrive at the presently claimed invention. Therefore the rejection of claims 14-15 and 20-21 is maintained for the reasons of record.

### ***Allowable Subject Matter***

Claims 16-19 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims. The cited prior art does not disclose or suggest removing a portion of the second type ion-doped region and a portion of the first type ion-doped well between the second type ion doped region and the first type ion

Art Unit: 2812

doped buried layer to form a second opening that exposes a portion of the first type ion-doped buried layer and depositing conductive material into the second opening.

Claims 22-27 are allowed. The cited prior art does not disclose or suggest forming at least one first contact opening and at least one second contact opening in the dielectric layer, wherein the first contact opening exposes a portion of the metal silicide layer and the second contact opening exposes the first type ion doped well to the bottom of the shallow trench isolation structure; forming a second type ion-doped region in the first type ion-doped region at the bottom of the shallow trench isolation structure; and forming a contact inside the first contact opening and the second contact opening as required by the afore mentioned Claims.

### ***Drawings***

Figure 6 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). Corrected drawings in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.



**Conclusion**

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Divisional Application, US Patent 6,835,977 is cited to show the state of the art.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Alexander G. Ghyka whose telephone number is (571) 272-1669. The examiner can normally be reached on Monday through Thursday during general business hours.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Lebentrit can be reached on (571) 272-1873. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

\*\*\*

AGG  
January 24, 2006

ALEXANDER GHYKA  
PRIMARY EXAMINER

AV 2812  
